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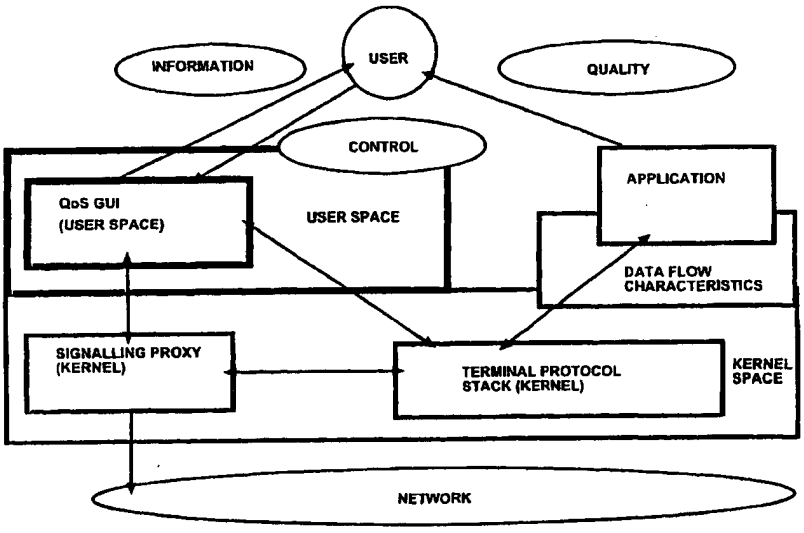

(57) Abstract: A telecommunications system, adapted to operate as a platform for the provision of multi-media data services, has a QoSUI (Quality of Service User Interface) adapted to map applications traffic onto specified data flows. The results are presented to a user via a graphical user interface. In addition, the QoSUI is adapted to enable a user to select a desired data flow and set QoS parameters therefor. QoS parameters selected by a user are translated into parameters meaningful to the transmission network and transmitted thereto. The QoS parameters may include desired bandwidth and protocol specific parameters. The QoSUI may be adapted to provide a user with information on costs associated with a specific application and total costs incurred by a current session.

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Improvements in, or Relating to, Telecommunications Service Provision

The present invention relates to a telecommunications system adapted to facilitate control of QoS (Quality of Service) by a telecommunications subscriber, subscriber apparatus having a QoSUI (Quality of Service User Interface), a client server having a QoSUI and a method for facilitating control of QoS by a telecommunications subscriber.

When end users wish to specify the QoS in the network, there is no easy way to map the user's demand for QoS onto the specifications in the network nodes. The user wants to choose a certain QoS for a specified data flow, and send an instruction to the network specifying this QoS. The underlying functionality of such an arrangement should, of course, be hidden from the user.

The present invention lets a user control the QoS of a service, get information about the current status of the network, and observe the change in quality in the application being run.

Determining which application's traffic is represented by a given data flow cannot easily be achieved. Experienced users may use the standard program "netstat" (a "standard", in this context, means a component which can be found on almost every networking platform currently used) to find out which TCP/UDP connections are currently active on the client server, and map them manually to a specific application. In the present invention, this mapping is made by the Quality of Service User Interface (QoSUI), either by presenting a user-friendly list of applications, or just a "netstat"-like presentation to the user. It is vitally important that the user interface is simple to use. A user should be able to find what he/she is looking for from a quick glance at the list of data flows, be it a FTP session, a video stream, or any other application that can be mapped to a data flow.

Even if a user is able to identify a flow for which he/she desires to set a specific QoS, there is currently no mechanism for doing so. The user should be able to select a specific flow in the User Interface, set QoS parameters, such as

desired bandwidth and protocol-specific parameters, and send them to the network in an easy way.

Whenever any kind of QoS configuration is set up in the network, the user should be able to check the flows that currently have resources bound to them. Information about the current settings for QoS should be updated quickly and regularly, to provide the user with the current status.

If the network architecture supports charging, real-time charging information can be presented to the user through the QoSUI. This may include information on the current cost for specific applications, as well as a total of all charges. Some service providers, or network operators, might regard a facility which presents a subscriber with charging and billing information in real-time as bad from a marketing point of view. This particular feature of the present invention is, therefore, optional.

QoS for a specific application, or data flow, is generally achieved by altering the application software itself, making it QoS-aware. Using a general QoS user interface makes resource reservations easier, and by collecting all information about the current reservations, the user gets a better overview of the state of the network.

According to a first aspect of the present invention, there is provided a telecommunications system, adapted to operate as a platform for the provision of multi-media data services, and including a transmission network, characterised in that said telecommunications system has a QoSUI adapted to map applications traffic onto specified data flows and to present the mapping to a user via a graphical user interface and in that said QoSUI is adapted to enable a user to select a desired data flow and set QoS parameters therefor.

The mapping of applications traffic onto data flows may be presented as a list of applications.

Transmission means may be provided adapted to transmit QoS

parameters selected by a user to said transmission network.

Said QoS parameters may include desired bandwidth and protocol specific parameters.

Said QoSUI may be adapted to enable a user to determine which data flows have resources bound to them.

Said QoSUI may be adapted to provide a user with information on costs associated with a specific application and total costs incurred by a current session.

Said QoSUI may be adapted to communicate with a client server•s underlying structure to produce a list of data flows to which QoS resources can be bound, said QoSUI may be adapted to enable a user to select a QoS to be applied to a data flow to which QoS resources can be bound and intelligent decisions may be referred to a client software module.

Said QoSUI may be adapted to communicate with a client server•s underlying structure to produce a list of data flows to which QoS resources can be bound, said QoSUI may be adapted to enable a user to select a QoS to be applied to a data flow to which QoS resources can be bound and intelligent decisions may be referred to a user.

Said QoSUI may be adapted to present available data flows of a client server to a user as either a mapping to a corresponding application, or as a specific TCP/UDP flow, together with a current cost, bound resource and available resource status.

Said QoSUI may be adapted to retrieve a user•s control actions, means may be provided to translate said control actions into QoS parameters of the transmission network and means may be provided to translate responses from said transmission network into user friendly messages addressed to a user.

Said QoSUI may include a graphical interface adapted to display at least

some of the following information:

- connection type;
- remote host identity;
- remote port;
- local port;
- allocated resource; and
- remote IP.

Said graphical interface may include a soft button to enable a user to update information displayed by said graphical interface, soft-controls may be provided to enable a user to adjust bandwidth requirements and said graphical interface may be adapted to display a current connection status.

Said graphical interface may be adapted to display a table listing information on current reservation status for a plurality of data flows each of which is associated with one, or more, applications.

According to a second aspect of the present invention, there is provided a subscriber terminal, for use with a telecommunications system, as set forth in any preceding paragraph characterised in that said subscriber terminal has a QoSUI adapted to map applications traffic onto specified data flows and to present the mapping to a user via a graphical user interface and in that said QoSUI is adapted to enable a user to select a desired data flow and set QoS parameters therefor.

According to a third aspect of the present invention, there is provided a client server, for use with a telecommunications system, as set forth in any preceding paragraph, characterised in that said client server has a QoSUI adapted to map applications traffic onto specified data flows and to present the mapping to

a user via a graphical user interface and in that said QoSUI is adapted to enable a user to select a desired data flow and set QoS parameters therefor.

The mapping of applications traffic onto data flows may be presented as a list of applications.

Transmission means may be provided adapted to transmit QoS parameters selected by a user to said transmission network.

Said QoS parameters may include desired bandwidth and protocol specific parameters.

Said QoSUI may be adapted to enable a user to determine which data flows have resources bound to them.

Said QoSUI may be adapted to provide a user with information on costs associated with a specific application and total costs incurred by a current session.

Said QoSUI may be adapted to communicate with a client server•s underlying structure to produce a list of data flows to which QoS resources can be bound, said QoSUI may be adapted to enable a user to select a QoS to be applied to a data flow to which QoS resources can be bound and intelligent decisions may be referred to a client software module.

Said QoSUI may be adapted to communicate with a client server•s underlying structure to produce a list of data flows to which QoS resources can be bound, said QoSUI may be adapted to enable a user to select a QoS to be applied to a data flow to which QoS resources can be bound and intelligent decisions may be referred to a user.

Said QoSUI may be adapted to present available data flows of a client server to a user as either a mapping to a corresponding application, or as a specific TCP/UDP flow, together with a current cost, bound resource and available

resource status.

Said QoSUI may be adapted to retrieve a user•s control actions, means may be provided to translate said control actions into QoS parameters of the transmission network and means may be provided to translate responses from said transmission network into user friendly messages addressed to a user.

Said QoSUI may include a graphical interface adapted to display at least some of the following information:

- connection type;
- remote host identity;
- remote port;
- local port;
- allocated resource; and
- remote IP.

Said graphical interface may include a soft button to enable a user to update information displayed by said graphical interface, soft-controls may be provided to enable a user to adjust bandwidth requirements and said graphical interface may be adapted to display a current connection status.

Said graphical interface may be adapted to display a table listing information on current reservation status for a plurality of data flows each of which is associated with one, or more, applications.

According to a fourth aspect of the present invention, there is provided a method of operating a telecommunications system, adapted to operate as a platform for the provision of multimedia data services, characterised by presenting

a mapping of applications traffic onto specified data flows to a user via a QoSUI and by enabling a user to select a desired data flow and set QoS parameters therefor.

Data flows may be mapped onto applications traffic and the mapping may be presented to a user as a list of applications.

QoS parameters selected by a user may be transmitted to said transmission network.

Said QoS parameters may include desired bandwidth and protocol specific parameters.

Said QoSUI may enable a user to determine which data flows have resources bound to them.

Said QoSUI may provide a user with information on costs associated with a specific application and total costs incurred by a current session.

Said QoSUI may communicate with a client server•s underlying structure to produce a list of data flows to which QoS resources can be bound, said QoSUI may enable a user to select a QoS to be applied to a data flow to which QoS resources can be bound and intelligent decisions may be referred to a client software module.

Said QoSUI may communicate with a client server•s underlying structure to produce a list of data flows to which QoS resources can be bound, said QoSUI may enable a user to select a QoS to be applied to a data flow to which QoS resources can be bound and intelligent decisions may be referred to a user.

Said QoSUI may present available data flows of a client server to a user as either a mapping to a corresponding application, or as a specific TCP/UDP flow, together with a current cost, bound resource and available resource status.

Said QoSUI may retrieve a user•s control actions, by translating said control actions into QoS parameters of the transmission network and may translate responses from said transmission network into user friendly messages addressed to a user.

At least some of the following information may be displayed:

- connection type;
- remote host identity;
- remote port;
- local port;
- allocated resource; and
- remote IP.

Embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 illustrates the information flows in a QoS aware environment.

Figure 2 illustrates an example of a QoS User Interface according to the present invention.

Referring now to Figure 1 of the accompanying drawings, a user is shown in relation to a user interface, an application running on a client server and the telecommunications network. The data flows from and to the user include information supplied to the user, user control data sent by the user to a client server, and application performance data. Information received by the user is derived from the QoS GUI(Graphical User Interface), via a signalling proxy, terminal protocol stack and application. Control of the system and the network, in

terms of available resource, to the extent this is possible, is exerted via the QoS GUI and signalling proxy. Control of the application operates via the QoS GUI and terminal protocol stack.

As previously observed, when end user applications are dependent on QoS in the network, there is no easy way to map a user's requirements, in respect of QoS, to specifications in the network nodes. The user needs to be able to choose a given QoS for a specified data flow, and send it to the network. The underlying functionality should, ideally, be hidden from the user so that operation of the QoSUI is user friendly.

The QoSUI maps an application's traffic onto specified data flows either by presenting a user-friendly list of applications, or a "netstat"-like presentation, to the user. A quick glance at the list of data flows enables the user to find what he/she is looking for, e.g. a FTP session, a video stream, or some other application that can be mapped to a data flow.

The present invention enables a user to select a specific flow in the User Interface, set QoS parameters, such as desired bandwidth and protocol-specific parameters, and send them to the network.

The present invention enables a user to check the data flows that currently have resources bound to them. Information about the current settings for QoS are updated quickly and regularly, to provide the user with the current QoS status.

If the network architecture supports charging, real-time charging information cab be presented to the user through the QoSUI. This may include information on the current cost for specific applications, together with a total charge.

Quality of Service for a specific application, or data flow, is generally achieved by altering the software itself, making it QoS-aware. Using a general QoS user interface makes resource reservations easier, and by collecting all information about the current reservations, the user gets a better overview of the

state of the network.

The present invention is a QoSUI which solves the aforementioned problems. It communicates with the underlying structures of the client•s server, produces a list of flows to which QoS resources can be bound, and lets the user choose the type of QoS that should be applied to each data flow. The QoSUI then sends these QoS requests to the network, and presents the result to the user. Intelligent decisions, such as downgrading of a denied request, can either be made in an underlying client software module, or can be presented to the user, who will then make the decision based upon his/her objective.

The QoSUI, as the user interface between the user and the network QoS architecture, has to perform two tasks, namely:

1. The QoSUI presents the actual status and available data flows of the client server, to the user. Data flows are presented to the user in an intuitive way, either as a mapping to the corresponding application, or to the specific TCP/UDP flow. The status of current costs, bound resources and available resources, are easily accessible to the user.

2. The QoSUI retrieves the wishes and control actions of the user relating to the parameters of the QoS network. This is a translation mechanism where abstract user-friendly terms are translated to the more complex QoS parameters of the network. Responses from the network are also translated into easy-to-understand messages that can be directed to the user.

The VDU appearance of the QoSUI, used in the present invention, is illustrated in Figure 2. As can be seen from the drawing the user is presented with a standard Windows format for the QoSUI. Active connections have the following information displayed on screen:

- connection type, e.g. UDP, TCP;

- remote host identity;
- remote port;
- local port;
- allocated resource, e.g. transmit (f) and receive (r) bandwidth; and
- remote IP.

A soft button is provided to enable a user to update this information.

Soft-controls are provided (sliders) to allow the user to adjust his/her bandwidth requirements, together with a •round• box, and soft buttons for clear and allocate.

The current connection status is also shown, including current charge rates and the total session cost. The status indicator is provided with soft buttons for •OK•, •Cancel• and •Help•.

It can thus be seen that the QoSUI, as presented to the user, is simple, easy to use, and employs a user friendly format with which the majority of users will be familiar.

Since each application, or data flow, has it's own resource demand, resources can be bound for a multitude of flows simultaneously. Each of these flows shows up in a table with information about its current reservation status. For example, a 10 Mb/s link can be divided up between sessions, so that the FTP session gets a 5 Mb/s link rate, the RealVideo session gets a 200 Kb/s and the remaining applications share the remaining 5 Mb/s in an old-fashioned best effort style. The exact style and parameters depend, of course, on the underlying QoS architecture.

The present invention can be used in any system where bandwidth, or any

other resource, can be reserved in a network. There are, however, two requirements that the system must fulfill, namely:

1. There has to be some kind of signalling protocol that the QoSUI of the present invention can use for signalling into the network. For ease of migration, there should also be an API, or similar structure, for the QoS architecture, which can then be used by the user interface.

2. There must be a mechanism for the user interface to obtain a list of data flows, or sessions, for the machine on which it is running. The more information that is available to the user interface, the easier it will be for the user to make decisions regarding the network QoS.

How to fulfill these requirements will be readily apparent, to the man skilled in the art. However, details of a signalling protocol, the subject of our co-pending patent application (Kgp 22/99), are set out below.

Multimedia applications with distinct quality parameters, e.g. video frame rate, picture resolution, or audio sampling rate, have a certain set of possible resource values that they require from the network. The set of these resource values can be expressed in a Resource Vector. Moreover, users have different opinions about the different quality settings and assign different price thresholds to each resulting in a Price Vector. These two kinds of information can be combined in a Downgrade Vector, which can be carried in the reservation message (e.g. RSVP/RESV or IRMA/RING). Routers, or ATM switches, can utilise the downgrade vector for intelligent resource reservation.

Multimedia applications usually have several parameters which influence the amount of network resource, e.g. bandwidth, or multiplexing buffer size, they require for a given QoS. For instance, by altering the video coding parameters of a scalable MPEG application, its bandwidth requirement scales from 2.7, 3.085, 3.6, 4.32, 5.4, 7.2 up to 10.8 Mbps, see CAMVision-2 7615, User Guide, Litton Network Access Systems, Inc., October 1998. For describing the general case, the following terminology can be used:

- the number of independent quality parameters of the multimedia application is denoted by N;

- the number of values which can be taken by the nth parameter is denoted by x_n, where n=1,2...N;

- the number of independent network resource types, e.g. bandwidth, token bucket size, route, priority, ..., which are demanded by the application is denoted by K; and

- the set of possible resource values for the kth resource type, given in a set is denoted by

$$\Phi_k = \{r_{k,1}, r_{k,2}, \ldots\ldots r_{k,L_k}\} \qquad k = 1,2\ldots K$$

where L_k denotes the number of elements in the i^{th} resource set, i.e. the number of combinations of every parameter influencing how much the application requires from the k^{th} resource type and L_k is given by:

$$L_k = \prod_{i=1}^{N} x_i \qquad k = 1,2\ldots\ldots K$$

The elements of each Resource Vector can be sorted in descending order yielding K Resource Vectors:

$$r_k = \left\lfloor r_{k,1}, r_{k,2}, \ldots r_{k,L_k} \right\rfloor \quad r_i^k \le r_j^k \Leftrightarrow i > j, \quad i,j = 1,2,\ldots L_k; \quad k = 1,2,\ldots K$$

This represents the special information that can be determined in accordance with the capabilities of the multimedia application. It should be noted that some combinations of the N parameters result in the same resource requirement, thus neighbouring elements of a Resource Vector can be equal.

The second task is to describe how much the user prefers the different application performances which result from different parameter settings. The simplest way to achieve this task is to establish a vector describing the maximum price that the user is prepared to pay for the different settings of the parameters. Price is simply considered as a type of metric for ranking purposes. In this context •price• relates to a users preference and does not represent an absolute value and has nothing to do with real charge, cost, or price. If the user does not want to accept a certain parameter combination, he may give 0 as a threshold, in other words he states that he does not wish to pay anything for the quality resulting from this setting. There is a Price Vector for each resource type, namely:

$$p_k = \lfloor p_{k,1}, p_{k,2}, \ldots p_{k,L_k} \rfloor \quad p_{k,i} \in \{0,1,\ldots P\}, \quad i = 1,2\ldots L_k \quad k = 1,2,\ldots K$$

where P denotes the maximum 'price' in the system (e.g. 65535 or 255).

Default 'prices' can be determined from user trials and can be individually adjusted for each user.

The information about the application and user behaviour, i.e. the Resource and Price Vectors, can be merged into the Downgrade Vector. This vector specifies the resource amounts which the application supports and the user is ready to accept, in a descending order, and can be expressed as:

$$d_k = \lfloor d_{k,1}, d_{k,2}, \ldots . d_{k,J_k} \rfloor \qquad d_{k,i} \in \Phi_k \qquad i = 1,2,..J_k; \quad k = 1,2\ldots K$$

where J_k denotes the number of elements in the Downgrade Vector belonging to the k^{th} resource type. This can be equal, or less than, L_k, because all resource values which are not unique, or for which the price is zero or not unique, may be omitted from the Downgrade Vector. It should be noted that the price is not unique if the user does not perceive any difference in the application quality when a quality parameter is changed. Therefore, different parameter combinations, i.e. resource values, may be equally preferred, (priced), by the user.

The Downgrade Vector, d_k, expresses the information that the network nodes consider during the reservation of the k^{th} resource.

The Downgrade Vector can be calculated in many ways, including:

- by the terminal sending the reservation request;
- at the policy enforcement point, e.g. access routers; and
- by the policy server using the Resource and Price Vectors stored in the policy database.

The three scenarios referred to above will now be described.

Consider the use of an intelligent terminal. In this scenario, the terminal has the Resource and Price Vectors. Both can be retrieved from a configuration file, or from the policy server, or can be directly requested from the user. The Downgrade Vector can be calculated for each application demanding QoS in advance, or just before sending the reservation message.

In the case of policy enforcement in the access node, the user requesting resource reservation is first authenticated to the access node, i.e. the user starts a user session. The access node can look up the Price Vector belonging to the identified user in its user database, or that of the ISP. After authentication, the user specifies the service session by giving some reference to the service, the other parties and the required quality. The access node uses this information to find the right policy for the user and the service, e.g. by contacting the policy server. This policy information contains the proper Price Vector, or at least a part of it, if the user is not allowed to take all resource values. The access node can then calculate the Downgrade Vector and initiate the reservation by sending the Downgrade Vector in a reservation message (e.g. IRMA/RING).

In the case of a static handling policy, the policy server stores pre-calculated Downgrade Vectors for each application and user, or application group and user group. The host, or the access node, retrieves these preexisting Downgrade Vectors before initiating a reservation.

The Downgrade Vector can be built into any resource reservation protocol, which handles explicit resource demands, e.g. ATMF/UNI, ITU/Q.2931, IETF/RSVP and IRMA/RING. The network nodes are then able to perform downgrading based on the Downgrade Vector.

The Resource and Price Vectors can be built into policy servers, which store the relationships among users - applications - and network policy. Instead of a simple high/low priority mapping, a complete Preference Vector can be stored in this table. The policy can be obtained by the policy enforcement point, or the sending host, and merged together into a Downgrade Vector.

The advantages of using the Downgrade Vector, as outlined above, include:

- fewer connection setup trials yielding:
  - shorter and fixed connection setup time;
  - less demand for temporarily allocated resources, leading to a reduced probability of call blocking; and
  - fewer signalling messages per connection setup;
- dynamic policy handling; and
- more useful and informative network policies, i.e. not only high, medium, low priority.

Known signalling protocols for resource reservation specify only one, or two, bandwidth values, while the downgrade vector describes the full range of possible resource amounts for several resource types which can be taken by the application and which are preferred by the user.

The present invention has particular application to the IRMA (Intelligent Resource Management Architecture) project, an ongoing internal project conducted by Telia Research. A new, hop-by-hop resource reservation protocol, called RING, has been implemented in the IRMA Router prototype. The current prototype will be extended by:

- the use of a QoS User Interface on the user's terminal which can connect to the policy server, retrieve the Resource and Price Vectors and calculate the Downgrade Vector for the applications for which the user wants to reserve resources;

- the RING reservation message being extended with a field carrying the Downgrade Vector; and

- RING-aware nodes performing downgrading using the Downgrade Vector.

Protocol-specific variables can either be dynamically configured, or hidden beneath a user friendly interface. Some resource reservation protocols may need to be adapted to take full advantage of the user interface. But the fundamental structure of the system is more or less system-independent. This means that the invention can be used in most modern operating systems, including Windows, Linux, Sun Solaris, Amiga OS etc. Most IP based application that benefit from reserved resources can be used, such as FTP, video conferences, streaming video, network multiplayer games etc.

The present invention can be used for group access for residential users, for ISDN users, modem users and mobile users, who might want to easily set different resources for different applications because of limited network resources.

The present invention presents network resources to the user in an understandable and easy way. The resources of each flow, or application, can easily be examined and changed.

Multiple resource reservation protocols share the same common interface. Changes of resources in the network are immediately shown as a change in the interface. Instant feedback of charging information for every session can be given to the user.

The proposed QoSUI is a unique solution as the graphical user interface of a resource reservation system, which represents and configures network resources. Previous attempts at handling network resources have been hard-coded into each specific application, giving no overview of the resources being used by different applications.

A prototype of the present invention has been developed by Telia, where a proprietary network resource reservation protocol (RING) was used to allocate resources to the flows specified on the QoSUI. In the prototype, IP flows are presented to the user, who can then select flows and manipulate their resources. It gives an overview of what resources are bound to what flows, and shows basic billing information to the user when a flow is double- clicked. The prototype is fully functional, and solves all of the aforementioned problems.

It should be immediately apparent, to those skilled in the art, how to produce a more modular version of the QoSUI of the present invention, where the underlying structures of the network resource reservation procedures can be completely proprietary. Making the QoSUI work with standard resource reservation signalling protocols such as RSVP will also improve the power of this invention.

CLAIMS

1. A telecommunications system, adapted to operate as a platform for the provision of multi-media data services, and including a transmission network, characterised in that said telecommunications system has a QoSUI adapted to map applications traffic onto specified data flows and to present the mapping to a user via a graphical user interface and in that said QoSUI is adapted to enable a user to select a desired data flow and set QoS parameters therefor.

2. A telecommunications system, as claimed in claim 1, characterised in that the mapping of applications traffic onto data flows is presented as a list of applications.

3. A telecommunications system, as claimed in either claim 1, or claim 2, characterised in that transmission means are provided adapted to transmit QoS parameters selected by a user to said transmission network.

4. A telecommunications system, as claimed in any previous claim, characterised in that said QoS parameters include desired bandwidth and protocol specific parameters.

5. A telecommunications system, as claimed in any previous claim, characterised in that said QoSUI is adapted to enable a user to determine which data flows have resources bound to them.

6. A telecommunications system, as claimed in any previous claim, characterised in that said QoSUI is adapted to provide a user with information on costs associated with a specific application and total costs incurred by a current session.

7. A telecommunications system, as claimed in any previous claim, characterised in that said QoSUI is adapted to communicate with a client server's underlying structure to produce a list of data flows to which QoS resources can be

bound, in that said QoSUI is adapted to enable a user to select a QoS to be applied to a data flow to which QoS resources can be bound and in that intelligent decisions are referred to a client software module.

8. A telecommunications system, as claimed in any of claims 1 to 6, characterised in that said QoSUI is adapted to communicate with a client server•s underlying structure to produce a list of data flows to which QoS resources can be bound, in that said QoSUI is adapted to enable a user to select a QoS to be applied to a data flow to which QoS resources can be bound and in that intelligent decisions are referred to a user.

9. A telecommunications system, as claimed in any previous claim, characterised in that said QoSUI is adapted to present available data flows of a client server to a user as either a mapping to a corresponding application, or as a specific TCP/UDP flow, together with a current cost, bound resource and available resource status.

10. A telecommunications system, as claimed in any previous claim, characterised in that said QoSUI is adapted to retrieve a user's control actions, in that means are provided to translate said control actions into QoS parameters of the transmission network and in that means are provided to translate responses from said transmission network into user friendly messages addressed to a user.

11 A telecommunications system, as claimed in any previous claim, characterised in that said QoSUI includes a graphical interface adapted to display at least some of the following information:

- connection type;
- remote host identity;
- remote port;
- local port;

- allocated resource; and

- remote IP.

12. A telecommunications system, as claimed in claim 11, characterised in that said graphical interface includes a soft button to enable a user to update information displayed by said graphical interface, in that soft-controls are provided to enable a user to adjust bandwidth requirements and in that said graphical interface is adapted to display a current connection status.

13. A telecommunications system, as claimed in claim 12, characterised in that said graphical interface is adapted to display a table listing information on current reservation status for a plurality of data flows each of which is associated with one, or more, applications.

14. A subscriber terminal, for use with a telecommunications system, as claimed in any of claims 1 to 13, characterised in that said subscriber terminal has a QoSUI adapted to map applications traffic onto specified data flows and to present the mapping to a user via a graphical user interface and in that said QoSUI is adapted to enable a user to select a desired data flow and set QoS parameters therefor.

15. A client server, for use with a telecommunications system, as claimed in any of claims 1 to 13, characterised in that said client server has a QoSUI adapted to map applications traffic onto specified data flows and to present the mapping to a user via a graphical user interface and in that said QoSUI is adapted to enable a user to select a desired data flow and set QoS parameters therefor.

16. A subscriber terminal, or client server, as claimed in claim 14, or 15, characterised in that the mapping of applications traffic onto data flows is presented as a list of applications.

17. A subscriber terminal, or client server, as claimed in any of claims 14 to 16,

characterised in that transmission means are provided adapted to transmit QoS parameters selected by a user to said transmission network.

18. A subscriber terminal, or client server, as claimed in any of claims 14 to 17, characterised in that said QoS parameters include desired bandwidth and protocol specific parameters.

19. A subscriber terminal, or client server, as claimed in any of claims 14 to 18, characterised in that said QoSUI is adapted to enable a user to determine which data flows have resources bound to them.

20. A subscriber terminal, or client server, as claimed in any of claims 14 to 19, characterised in that said QoSUI is adapted to provide a user with information on costs associated with a specific application and total costs incurred by a current session.

21. A subscriber terminal, or client server, as claimed in any of claims 14 to 20, characterised in that said QoSUI is adapted to communicate with a client server•s underlying structure to produce a list of data flows to which QoS resources can be bound, in that said QoSUI is adapted to enable a user to select a QoS to be applied to a data flow to which QoS resources can be bound and in that intelligent decisions are referred to a client software module.

22. A subscriber terminal, or client server, as claimed in any of claims 14 to 20, characterised in that said QoSUI is adapted to communicate with a client server•s underlying structure to produce a list of data flows to which QoS resources can be bound, in that said QoSUI is adapted to enable a user to select a QoS to be applied to a data flow to which QoS resources can be bound and in that intelligent decisions are referred to a user.

23. A subscriber terminal, or client server, as claimed in any of claims 14 to 22, characterised in that said QoSUI is adapted to present available data flows of a client server to a user as either a mapping to a corresponding application, or as a specific TCP/UDP flow, together with a current cost, bound resource and available

resource status.

24. A subscriber terminal, or client server, as claimed in any of claims 14 to 23, characterised in that said QoSUI is adapted to retrieve a user•s control actions and in that means are provided to translate said control actions into QoS parameters of the transmission network and in that means are provided to translate responses from said transmission network into user friendly messages addressed to a user.

25. A subscriber terminal, or client server, as claimed in any of claims 14 to 24, characterised in that said QoSUI includes a graphical interface adapted to display at least some of the following information:

- connection type;
- remote host identity;
- remote port;
- local port;
- allocated resource; and
- remote IP.

26. A subscriber terminal, or client server, as claimed in claim 25, characterised in that said graphical interface includes a soft button to enable a user to update information displayed by said graphical interface, in that soft-controls are provided to enable a user to adjust bandwidth requirements and in that said graphical interface is adapted to display a current connection status.

27. A subscriber terminal, or client server, as claimed in claim 26, characterised in that said graphical interface is adapted to display a table listing information on current reservation status for a plurality of data flows each of which

is associated with one, or more, applications.

28. A method of operating a telecommunications system, adapted to operate as a platform for the provision of multimedia data services, characterised by presenting a mapping of applications traffic onto specified data flows to a user via a QoSUI and by enabling a user to select a desired data flow and set QoS parameters therefor.

29. A method, as claimed in claim 28, characterised by mapping applications traffic onto data flows and presenting the mapping to a user as a list of applications.

30. A method, as claimed in either claim 28, or claim 29, characterised by transmitting QoS parameters selected by a user to said transmission network.

31. A method, as claimed in any of claims 28 to 30, characterised by said QoS parameters including desired bandwidth and protocol specific parameters.

32. A method, as claimed in any of claims 28 to 31, characterised by said QoSUI enabling a user to determine which data flows have resources bound to them.

33. A method, as claimed in any of claims 28 to 32, characterised by said QoSUI providing a user with information on costs associated with a specific application and total costs incurred by a current session.

34. A method, as claimed in any of claims 28 to 33, characterised by said QoSUI communicating with a client server•s underlying structure to produce a list of data flows to which QoS resources can be bound, by said QoSUI enabling a user to select a QoS to be applied to a data flow to which QoS resources can be bound and by intelligent decisions being referred to a client software module.

35. A method, as claimed in any of claims 28 to 33, characterised by said QoSUI communicating with a client server•s underlying structure to produce a list

of data flows to which QoS resources can be bound, by said QoSUI enabling a user to select a QoS to be applied to a data flow to which QoS resources can be bound and by intelligent decisions being referred to a user.

36. A method, as claimed in any of claims 28 to 35, characterised by said QoSUI presenting available data flows of a client server to a user as either a mapping to a corresponding application, or as a specific TCP/UDP flow, together with a current cost, bound resource and available resource status.

37. A method, as claimed in any of claims 28 to 36, characterised by said QoSUI retrieving a user•s control actions, by translating said control actions into QoS parameters of the transmission network and by translating responses from said transmission network into user friendly messages addressed to a user.

38 A method, as claimed in any of claims 28 to 37, characterised by displaying at least some of the following information:

- connection type;
- remote host identity;
- remote port;
- local port;
- allocated resource; and
- remote IP.

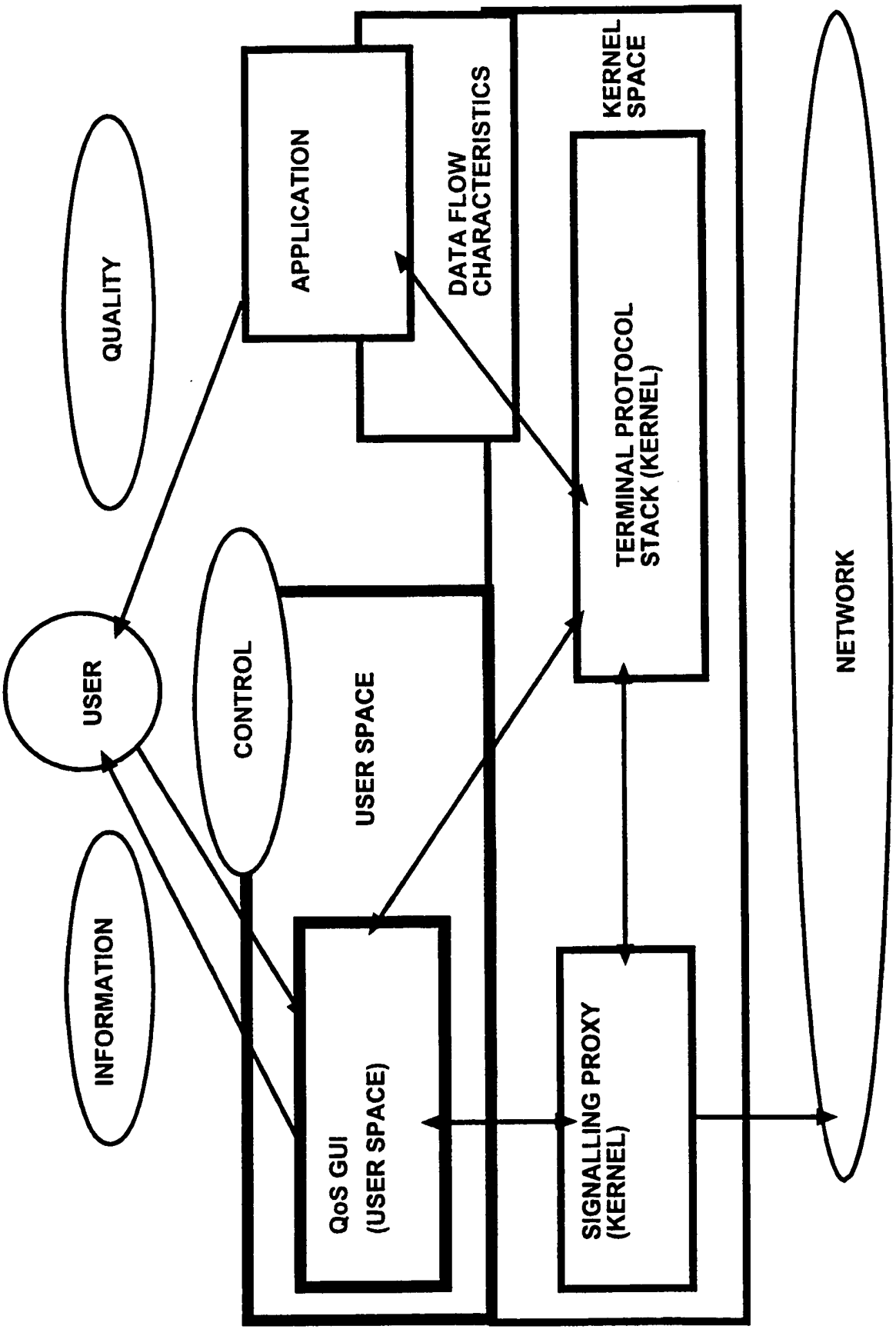
QUALITY
APPLICATION
DATA FLOW CHARACTERISTICS
KERNEL SPACE
TERMINAL PROTOCOL STACK (KERNEL)
NETWORK
USER
CONTROL
USER SPACE
INFORMATION
QoS GUI (USER SPACE)
SIGNALLING PROXY (KERNEL)

FIGURE 1

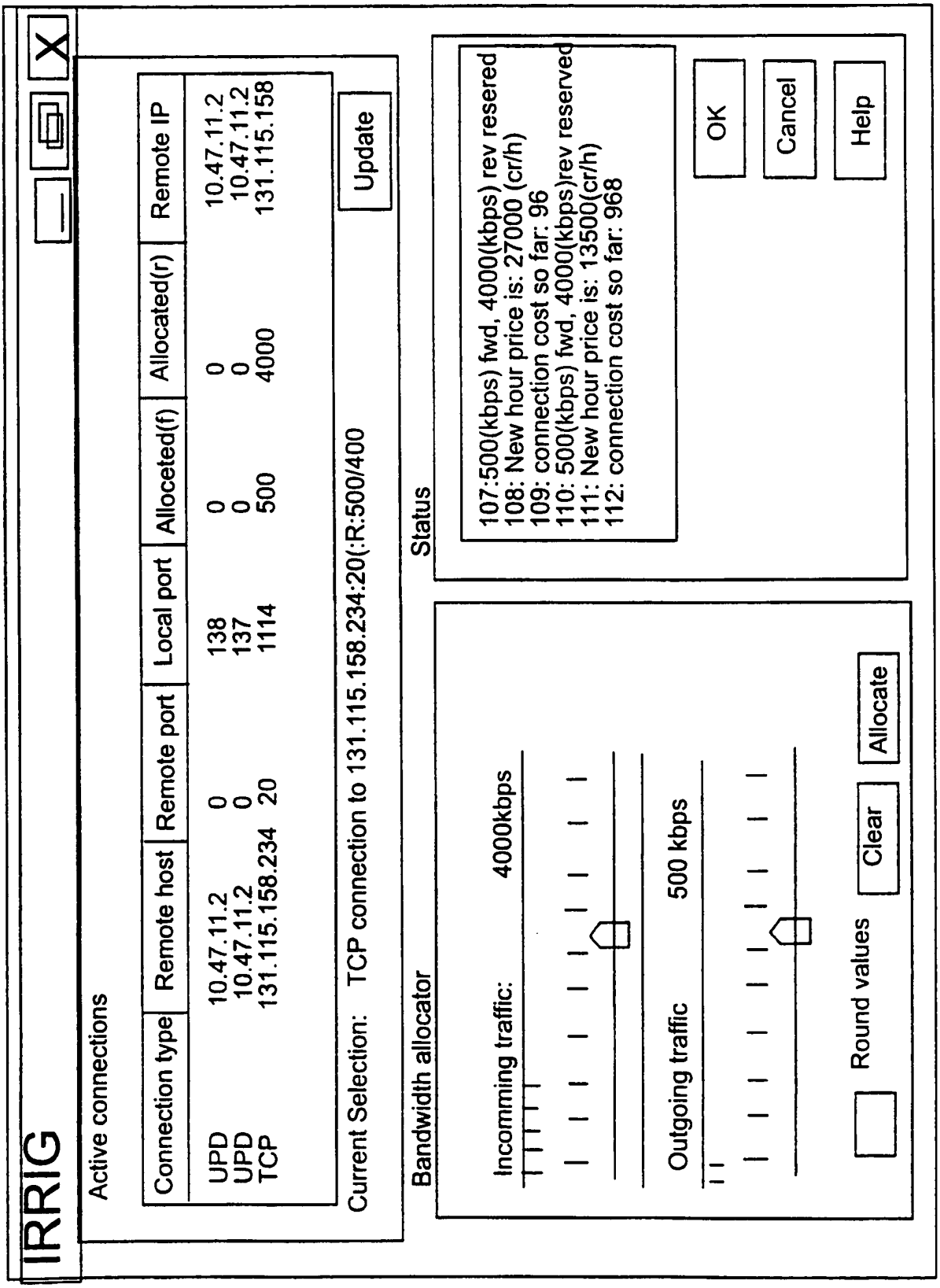
IRRIG
Active connections
Connection type
Remote host
Remote port
Local port
Alloceted(f)
Allocated(r)
Remote IP
UPD 10.47.11.2 0 138 0 0 10.47.11.2
UPD 10.47.11.2 0 137 0 0 10.47.11.2
TCP 131.115.158.234 20 1114 500 4000 131.115.158
Current Selection: TCP connection to 131.115.158.234:20(:R:500/400
Update
Bandwidth allocator
Incomming traffic: 4000kbps
Outgoing traffic 500 kbps
Round values
Clear
Allocate
Status
107:500(kbps) fwd, 4000(kbps) rev resered
108: New hour price is: 27000 (cr/h)
109: connection cost so far: 96
110: 500(kbps) fwd, 4000(kbps)rev reserved
111: New hour price is: 13500(cr/h)
112: connection cost so far: 968
OK
Cancel
Help

Figure 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/01341

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 11/04
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q, H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	4th COST 237 Workshop, Volume, December 1997, (Lisbon), Jérome Tassel et al, "An End to End Price-Based QoS Control Component Using Reflective Java" --	1-38
A	Proceedings of the IWQOS'98 Workshop, Volume, 1998, (Nappa Valley, CA), Errin W. Fulp et al, "Paying for QoS: An Optimal Distributed Algorithm for Pricing Network Resources" --	1-38
A	IEEE Proceedings of Multimedia'96, Volume, 1996, Gabriel Dermler et al, "A Negotiation and Resource Reservation Protocol (NRP) for Configurable Multimedia Applications" -- --------	1-38

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
24 October 2000	26 -10- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Roger Bou Faisal/LR Telephone No. +46 8 782 25 00